



NEWS RELEASE

United States Air Force

Air Force Materiel Command

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AMERICA'S AIR & SPACE ADVANTAGE

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Date: August 30, 2004

Release: 2004-279

Photo: d0408537

Center launches new era of impact testing

AEDC revamps 'Chicken Gun' to help shuttle return to flight

ARNOLD AIR FORCE BASE, TENN. – The U.S. Air Force's Arnold Engineering Development Center (AEDC) continues supporting NASA's Space Shuttle Return to Flight (RTF) program in unique test facility.

Engineers and test operators in the Ballistic Impact Range S-3, also known worldwide as the Chicken Gun, are launching hundreds of block-shaped projectiles made of foam materials used on the shuttle's external tank. These "shots" simulate pieces of external tank foam breaking away from the tank during flight and striking various parts of the space shuttle such as the solid rocket booster (SRB).

Test operators launch the blocks at various velocities and angles to simulate the different ways in which foam might strike the SRBs. These tests will help determine the effects of foam impact, provide information on the SRB hardware's ability to withstand those impacts and help populate a database for future reference.

Sponsored by the Marshall Space Flight Center (MFSC) in Huntsville, Ala., the program consists of multiple phases being conducted at several test facilities across the country. AEDC's contribution involves a portion of the SRB impact testing.

"Many parts of the space shuttle are being impact-tested at different test facilities in the country," said Allard Beutel, NASA spokesperson. "This creates a significant demand for a unique test capability, and the SRB Project is fortunate to have AEDC's test capability available and conveniently located to MFSC."

Prior to each shot, the employees cut each projectile to specified lengths, widths and weights to ensure a successful shot.

"If the foam projectile is too loose in the barrel, it can cause the velocity to be lower than desired," said Lanny Bell, an AEDC project engineer. "If the projectile is too tight, it could break in the barrel during launch."

Jeff Venable, the procurement quality assurance representative for United Space Alliance, works with AEDC employees to ensure each projectile and target meets test specifications. United Space Alliance is the prime contractor for NASA's Space Shuttle Program.

"The AEDC folks are fantastic," Venable said. "You can tell they are completely dedicated and professional. Everybody is working toward the same goal of getting the shuttle back to flight. Their attitudes and work ethics are tremendous."

During each shot, employees use high-pressure helium gas to launch the projectiles at speeds from 150 to 2,255 feet per second down a new 86-foot-long rectangular barrel.

The targets include the struts connecting the solid rocket booster (SRB) and external fuel tank, core panels representative of the thermal protection system (TPS) materials and cover material for the range safety system (RSS) antennae that would be used to abort a mission if sufficient damage occurred to the shuttle.

High-speed video cameras operating at speeds up to 20,000 frames per second document the impact events and provide a means for measuring the velocity of the projectiles. Strain gauges and accelerometers on the targets panels acquire data at a sample rate of 50,000 samples per second to provide information on the stresses the target sustains during the impact event.

"As we carry out the CAIB (Columbia Accident Investigation Board) recommendations for safe return to flight, it is imperative that we determine the tolerance of the Space Shuttle elements, including the solid rocket booster (SRB), to withstand debris strikes and understand the effects," said Jack Hengel, NASA SSRB (Shuttle Solid Rocket Boosters) project manager

"These tests will identify impacts that result in component failures that may lead to loss of vehicle and crew. In these cases, changes will be required to either control the debris source, strengthen the component design, or both."

Editorial Note:

Arnold Engineering Development Center is the nation's largest complex of flight simulation test facilities. The center was dedicated in June 1951 by President Harry Truman and named after 5-star General of the Air Force Henry 'Hap' Arnold, visionary leader of the Army Air Forces in World War II and the only airman to hold 5-Star rank. Today, this \$7.6 billion complex has some 58 aerospace test facilities located at Arnold Air Force Base, Tenn., and the center's remote operating location Hypervelocity Tunnel 9 in White Oak, Md. The test facilities simulate flight from subsonic to hypersonic speeds at altitudes from sea level to space. Virtually every high performance flight system in use by the Department of Defense today and all NASA manned spacecraft have been tested in AEDC's facilities. Today the center is testing the next generation of aircraft and space systems. For more information on AEDC visit the center's Web site at www.arnold.af.mil

Caption for d0408537: Outside Machinist Larry Phipps loads a foam projectile into the 86-foot-long rectangular barrel used to conduct impact testing for the Space Shuttle Return to Flight program. (AEDCPhoto)

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